

PATENT SPECIFICATION

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(54) HALFTONE PRINTING PROCESS AND PLATES

(71) We, KOHAN KABUSHIKI KAISHA, a company organised and existing under the laws of Japan, of 18—9 Kasuga 2 Chome, Bunkyo-Ku, Tokyo-To, Japan, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

This invention relates generally to halftone printing and more particularly to a novel halftone printing process which can be readily practised in a simple and economical manner without requiring skilled operators to produce printed impressions having density ranges substantially equal to those of photographs.

Heretofore, the so-called "conventional" process, wherein variations in density are produced by the sizes of the halftone dots, has been generally practised as a halftone printing process. In representing tone in this conventional process, however, the regions in the vicinity of the smallest dots and the largest dots of the halftone dots are often neglected with respect to the techniques of photography and printing, and the highlight parts (small dot parts) and shadow parts (large dot parts) of the printed matter tend to become flat, whereby the maximum density cannot be elevated to that of a photograph.

For the purpose of overcoming this difficulty, the so-called "duotone" (doubletone) process was developed. By this duotone process, the halftone dot angle is changed so as to prevent moiré from being produced. By this process, however, in spite of some improvement in the highlight parts of the printed matter, density gradation for representing the shadow parts, which occupy a wide density range, is deficient, and it is not possible to fully represent tone.

Another known process is the complementary color process, in which color density is corrected by superimposing a light-color plate. By this process, also,

while the tone of the color is somewhat corrected, density gradation for representing the shadow parts of the printed matter is deficient and is not sufficient for representing tone.

In this representation of tone by combination with light color, it is very difficult to predict beforehand the tone of the finished printed impression. For this reason, this is often carried out in the proof stage, and several dot angles which will not give rise to moiré must be determined. At the same time, because of the difficulty of the work and the complex nature of the work process, an extremely high degree of technical skill is required. Moreover, work over a long period is necessary, and much material must also be used.

It would appear that representation of the shadow part on the printed matter occupying a wide density range by expanding the density range is possible by increasing the ink film thickness. However, as a result of a general behaviour of a printing ink, which is one kind of fluid, when the ink film thickness, that is, the solid density, is reduced, the dimensions of the dots produced by the transfer of the ink tend to undergo an overall shrinkage, whereas, when the ink film thickness, that is, the solid density, is increased, the sizes of the dots produced by the ink transfer tend to undergo an overall increase.

Consequently, when the solid density is lowered to reduce the size of the dots, the entire impression becomes of light color, and the tone becomes weak. Conversely, when the solid density is raised to increase the size of the dots, the entire impression becomes dark, and the tone becomes strong. As a result, the dot gain approaches a fill-in state, or fill in occurs, giving rise to blotching of the print, loss of the tone renderability, and overall darkening.

The tone renderability for every percentage of dot density is influenced by the ink film thickness, that is, the solid

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density, and the reproduction of the overall tone is determined by the accuracy of reproducibility of the individual dots. That is, the tone reproducibility of a printed impression depends on the accuracy of reproducibility of the size of the dots and the thickness of the ink film transferred onto these dots. This is true not only with monochrome process but also with color processes.

An offset halftone printing process according to this invention comprises a basic step of printing, in entirety, a basic impression, with a solid density to reproduce faithfully at least light-tone to middle-tone parts, of an original; and at least one supplemental step of printing a supplementary impression, with screen-dot areas smaller than those in corresponding parts of said basic impression, of only the parts of the original having screen-dot areas greater than a predetermined screen-dot area corresponding to a screen percentage equal to or greater than 50%; said steps being carried out in optional sequence, and the impressions being superimposed.

By the practice of the halftone printing process according to this invention, printing is carried out in entirety in a manner to make possible faithful expression of density tone gradation from middle parts through light parts, which has heretofore been possible, by means of an ordinary printing plate produced by contact printing a halftone screened film made from a transparent or reflection original copy, and superposed printing is carried out with a printing plate in which only the parts of high dot density are further lightly and supplementarily expressed, whereby the density tone gradation of only the parts of high dot density can be compensated for without disturbing the tone from the middle parts through the bright parts.

The invention also provides a set of half tone offset press plates, for use in carrying out the process, comprising a base plate which has been contact-photoprinted with a screened film made from a transparent or reflecting original to provide a basic impression having light tones, middle tones and dark tones varying in dot density from below 10% to about 90%, and at least one supplemental printing plate for printing a supplemental impression of only those parts of the original having screen-dot percentages greater than a value above 50%, said supplemental printing plate having a screen dot percentage which is less than the screen dot percentage of the base plate for each dot density of the original, said plates being correlated to print a superposed impression of the plates.

Since this supplementary or compensating printing is carried out with

the use of a printing plate in which only the parts of high dot density are lightly and supplementarily expressed, that is, a plate in which the area of the dots is reduced in comparison with that of a plate for overall printing, printing is possible without density curve discontinuity, moreover, with only the simple procedure of matching the register marks, and without the occurrence of moiré. Thus, an advantageous feature of this invention is that, since moiré is prevented from occurring excellent impressions can be obtained without the necessity of printing with varied dot angle.

The nature, principles, utility and further features of this invention will be more clearly apparent from the following detailed description.

In the drawings:

FIGURE 1 is a graph indicating variation of density relative to screen percentage (%) of printed matter printed by examples of practice of this invention; and

FIGURE 2 is a graph indicating variation of density relative to screen percentage (%) of printed matter printed by plates after the second plate.

In a first printing step, printing is first carried out with solid density such as to obtain printed matter in which the middle part to light part, that is, the part of a dot density less than 50 percent, is as close as possible to at least the theoretical value of the density curve. The plate (first plate) used in this step must not be one in which 10% of the dots appear to have disappeared, and 90% are filled in as in an ordinary plate, but must be one which has been faithfully reproduced. Preferably, the printing is carried out in a manner such that the parts of dot density less than 80% are faithfully reproduced.

These techniques have been established in the prior art and may be practised by ordinary methods.

In the case where the number of screen lines is relatively coarse, and it is desired to impart forceful intensity in the region from the middle part through the dark part, an increase in the size of the dots up to approximately +20% is permissible.

In a second printing step following the above described first printing step, printing is carried out by means of a second plate in which only the parts of dot density above 50%, preferably above 70%, and more preferably only the parts of high dot density above 90% are supplementarily expressed. A plate which is supplementarily expressed with a dot density above any point as a starting point may be used provided that the parts are of this dot density above 50%.

In this second printing step, an impression can be printed by superimposed impressions with a printing plate in which only the parts

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above 70% are supplementarily expressed, and the density range can be expanded to that similar to a photograph with a printing plate in which only the parts above 90% are supplementarily expressed.

In this second printing step, furthermore, the printed dots are somewhat smaller in area (i.e., expressed somewhat more lightly) than the dots in the first printing step in the corresponding parts, and, for this reason, a break or discontinuity in the density curve is not observable. Furthermore, it becomes possible to print with the ink density maintained constant.

More than two second printing steps can be carried out. For example, in the case of two second printing steps, the second impression of the second printing step is made with a plate on which is lightly expressed only the part of dot density higher than that expressed at the time of the first impression of the second printing step. For example, in the case where the first impression of the second step has been made with a dot density higher than 70% as the starting point, the second impression can be made with a dot density higher than 80% as the starting point. In the case of more than 90% as the starting point in the first impression, the second impression can be made with more than 95% as the starting point.

Use of two or more of the second printing steps in this manner produces a greater intensity, and printing of a density range equivalent to that of a photograph can be accomplished.

It is not necessary in all cases to use two or more second printing steps as described above. For example, when a solid density of 1.5 or higher value is produced in the first printing step, and a solid density of the same or higher value is produced in the second printing step, very good printed matter is obtained, although it is not so good as compared with the case where two or more second printing steps are used.

In this case, furthermore, by using a plate which lightly expresses the dots in only the parts above 80% in the second printing step and increasing the solid density thereby to produce in the maximum density part a density close to that in the case where two or more second printing steps are used, a result which is closer to the theoretical value than to the density curve of a paper print photograph is obtained.

Thus, the number of second printing steps and the values of the solid density and the dot density to be used as the starting point in the supplementary expression of the plate are determined by the character and use of the printed material to be thus obtained and are not basically limited in the practice of this invention.

For example, when the difficulties of trapping and offsetting are considered, a method wherein two or more second printing steps are not used in a multicolor press or a web offset printing press may be a desirable mode of practice in that it affords economy in labor cost, materials cost, and production cost and speedup of the production process.

In this connection, the sequence in which the first and second printing steps are carried out can be selected at will. The halftone printing process according to this invention is applicable not only to offset printing but also to various other halftone printing processes such as letterpress printing and gravure printing, and the resulting printed matter can not only be used as an ordinary printed matter but also be substituted for a real photograph by printing on paper. For example, the resulting printed matter can be used as a transparency for display by illumination from the reverse side, which was not possible with a conventional printed matter.

In accordance with this invention, it is possible to supplementarily express the darkest parts without disturbing the tone of the entire impression, to expand the density range, to attain the density of an original paper print photograph (reflection original copy) and, in some cases, to attain or exceed the highest density of an original positive film (transparent copy). More specifically, solid densities of 1.30 to 1.65 with yellow, 2.05 to 2.17 with magenta, 2.05 to 2.17 with cyan, 2.10 to 2.30 with black, and 2.30 compositely can be attained or even exceeded in some cases, and densities measured as transparent densities can reach or exceed in some cases the highest density of an original positive film and can exceed the highest density of an original paper print photograph.

Furthermore, in the second printing step, the density of the parts in which moiré can occur is very low, and, moreover, the dot area is smaller than that of the corresponding parts in the first printing step. Therefore, by accurately matching register marks, the occurrence of moiré can be prevented. In parts where the dot density is higher than 90% in the first printing step, no moiré, whatever, is observable.

By the practice of this invention, the density curves of the tones to be reproduced can be varied almost at will, and impressions exactly as desired can be obtained.

While the first press plate of this invention is of a construction similar to that of a press plate of the ordinary conventional process, it differs in that it is a plate wherein the parts thereof of high dot density, e.g., over 90%, and parts thereof of low dot density, e.g., less than 10%, are not

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neglected but are expressed. Ordinarily, since parts of a film screen of dot density over 90% are difficult to express on the printed matter, it is a common practice not to form dots in these parts. In accordance with this invention, however, formation of solid parts of this character are avoided as much as possible in the first plate.

The selection of the plate material of this first plate is not limited in this invention, it being possible to use plates for zinc plates, aluminum plates, pre-sensitized plates, deep-etch plates, and the like. In the case where the first plate is to be produced from a screen positive film, a plate material for screen positive use is used. For producing the first plate from a screen negative film, a plate material for screen negative use is used. Accordingly, in the preparation of the press plates (including the first and second plates and others, if necessary) according to this invention, either a positive or a negative screen film can be used.

The second plate differs from the first plate in that it is a plate somewhat lightly and supplementarily expressing only the parts of high dot density of the first plate. That is, this second plate prints only the middle-tone parts to be shadow parts in the printed matter. More specifically, the second plate has dots in only the parts of dot densities higher than 50%, preferably higher than 70%, and optimally higher than 90%. Accordingly, when the first and second plates are compared, it is observed that the parts in which dots are formed of the second plate are more restricted than those of the first plate.

Furthermore, since the second plate is more lightly expressed than the first plate, the area of the dots of the second plate is less than the area of the dots of the first plate in the corresponding parts in halftone printing expressed by the sizes of the dots, and when these first and second plates are used to print superposed impressions, discontinuities in the density curves are not observable.

In the practice of this invention, one or more plates similar to the second plate can be additionally used. For example, a third plate in which only the parts of the second plate of high dot density expressed somewhat more lightly than in the second plate, can be used. For example, in the case where parts of dot densities above 70% are expressed on the second plate, the third plate is preferably one on which parts of dot densities above 80% are expressed more lightly than on the second plate. In this case, the printed matter will have a forceful appearance.

Furthermore, in the case where the second plate expresses the parts of dot densities above 90%, a third plate expressing

only parts of dot densities above 95% more lightly than the second plate can be used. In this case, the printed matter can be made to have a tone effect of the same order as that of a photograph.

The second plate, third plate, etc., can elevate the density from the middle-tone parts to the dark parts of the printed matter without disturbing the expression of the tone of the entire printed matter, particularly from the middle-tone parts to the light parts, in conventional offset printing, in which the density cannot be elevated without disturbance of the tone due to dot gain of the printed matter. The reason for this is that the second plate, third plate, etc., express supplementarily only the parts of high dot density which parts, moreover, are lightly expressed.

The method of producing the press plates can vary. For example, on the first plate, a half-tone negative of a halftone positive is produced from a transparent or reflecting original by applying a screen to a negative or a positive film similarly as in the ordinary method. Any film can be used provided that it is one for screen use. Furthermore, the kind of screen, basically, is not limited. For example, a contact screen or a glass screen can be used. Screens of 65, 85, 100, 110, 120, 133, 150, 175, 200, 250, 300, etc., lines per 2.54 cm. (1 inch) can be used depending on the necessity.

For exposure, a flash is additionally used, care being taken to obtain all dots from smallest to largest without omission. The dots particularly in the shadow parts in the halftone positive, that is, dots above 90%, must not be filled in. In the case of halftone negative, conversely to the case of a halftone positive, the film is expressed without disappearance of the highlight parts below 10%.

Photoprinting is carried out by placing in a printing frame a plate blank which has been grained and has been sensitized with the film and printing by vacuum contact. For the light source, an ordinary arc lamp, a mercury lamp or the like is used.

Each of the plates after the second plate or third plate can also be produced by making a screened film, similarly as in the case of the first plate, from a transparent or reflecting original and contact printing on a plate blank. It is necessary, however, that this screened film be one which lightly and supplementarily expresses only the middle-tone parts to the dark parts (preferably dot densities above 50% with a halftone positive and dot densities below 50% with a halftone negative) on the printed matter of the plate subsequent to the first plate or the second plate.

In the case of a halftone positive from a screened film made from a transparent or a

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reflecting original, the plate after the second or third plate can be produced by varying the exposure time only on parts of high dot density (parts of low dot density in the case of a halftone negative) in the screening process step to produce the screened film and carrying out the printing therewith.

5 Furthermore, press plates of a number of steps can also be produced from a screened film made from a transparent or reflecting original by direct contact printing by varying the exposure time. By using an arc lamp, a mercury lamp or the like as the light source, and effecting control with the exposure time, light distance and the developing time, it is possible to produce the plates after the second plate or the third plate for supplementarily expressing only the parts of high dot density of the printed matter.

20 In each of these methods of producing the plates, a halftone positive or a halftone negative for, for example, offset, letterpress, or gravure can be used.

25 In printing with the use of the press plates of this invention, the printing ordinarily is carried out in the sequence of the first plate, second plate, third plate,, but the sequence, fundamentally, is not limited. For example, the printing may be carried out from the third plate or it may be carried out from the second plate, the printing order being selectable at will.

30 By producing a solid density of 1.5 or more in the printing step with the first plate

and printing with a similar solid density in the second plate printing step when printing is to be accomplished with only the first and second plates, it is possible to obtain printed matter which is superior to that heretofore attainable, although it is inferior to that obtained with the use of a third plate.

In order to indicate more fully the nature and utility of this invention, the following examples of practice thereof are set forth, it being understood that these examples are presented as being illustrative only and are not intended to limit the scope of the invention.

Examples.

Several press plates according to this invention were produced by using a 150/2.54 cm. screen in each case. Printing was carried out with these press plates, whereupon densities of respective printed matter at various dot densities as indicated in the following table were obtained.

In this table, the reference character A designates a printed matter printed by a first plate, and reference characters B, C, and D designate printed matter printed by second, third, and fourth plates, respectively. Furthermore, the combined designation A + B designates a printed matter printed superposedly by the first and second plates. Combined designations A + C, A + B + C, A + C + D, and B + C also designate printed matter printed by superposed printing.

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Measured Values of Density

	3	5	10	20	30	40	50	60	65	70	80	90	95	97	100 %	Measured values of density
1 A	0.04	0.08	0.14	0.22	0.29	0.39	0.49	0.75	0.89	1.01	1.25	1.47	1.60	1.61	1.67	
2 A	0.03	0.06	0.12	0.16	0.23	0.30	0.36	0.54	0.64	0.75	0.86	0.98	1.14	1.18	1.23	
3 A	0.03	0.05	0.10	0.15	0.22	0.27	0.35	0.51	0.60	0.72	0.82	0.96	1.07	1.17	1.25	
Average value	0.03	0.06	0.11	0.16	0.23	0.29	0.36	0.53	0.62	0.74	0.84	0.97	1.11	1.18	1.24	
4 A	0.04	0.07	0.12	0.17	0.23	0.30	0.38	0.56	0.64	0.77	0.90	1.02	1.17	1.30	1.33	
5 A	0.04	0.07	0.12	0.17	0.24	0.32	0.39	0.55	0.65	0.74	0.88	1.01	1.19	1.29	1.31	
6 A	0.03	0.05	0.11	0.16	0.22	0.30	0.38	0.56	0.64	0.79	0.91	1.07	1.20	1.28	1.31	
Average value	0.04	0.06	0.12	0.17	0.23	0.31	0.38	0.55	0.64	0.77	0.90	1.30	1.19	1.29	1.32	
7 A+B	0.05	0.08	0.15	0.22	0.29	0.37	0.46	0.64	0.77	0.91	1.30	1.61	1.79	1.90	1.91	
8 A+B	0.05	0.09	0.12	0.21	0.28	0.34	0.47	0.63	0.70	0.83	1.06	1.43	1.75	1.88	1.94	
9 A+B	0.05	0.09	0.16	0.22	0.30	0.38	0.47	0.67	0.74	0.91	1.18	1.51	1.77	1.91	1.93	
Average value	0.05	0.09	0.15	0.22	0.29	0.36	0.47	0.65	0.74	0.88	1.18	1.52	1.77	1.90	1.93	
10 A+B+C	0.05	0.09	0.15	0.21	0.29	0.36	0.49	0.71	0.79	0.94	1.39	1.79	2.09	2.19	2.22	
11 A+B+C	0.06	0.09	0.16	0.22	0.29	0.39	0.49	0.71	0.79	0.91	1.24	1.78	2.11	2.18	2.24	
12 A+B+C	0.05	0.07	0.14	0.22	0.28	0.36	0.48	0.67	0.78	0.92	1.31	1.75	2.10	2.16	2.21	
Average value	0.05	0.08	0.15	0.22	0.29	0.37	0.49	0.70	0.79	0.92	1.31	1.77	2.10	2.18	2.22	
13 A+C	0.04	0.06	0.12	0.16	0.21	0.28	0.36	0.54	0.61	0.74	0.87	1.10	1.63	1.80	1.83	
14 A+C	0.04	0.07	0.12	0.17	0.23	0.29	0.37	0.56	0.64	0.78	0.91	1.20	1.74	1.91	1.93	
15 A+C	0.04	0.07	0.12	0.17	0.22	0.30	0.37	0.55	0.65	0.78	0.93	1.26	1.74	1.85	1.90	
Average value	0.04	0.07	0.12	0.17	0.22	0.29	0.37	0.55	0.63	0.77	0.90	1.19	1.70	1.85	1.89	
16 A+C+D	0.04	0.06	0.11	0.15	0.21	0.28	0.35	0.52	0.60	0.73	0.87	1.21	1.70	1.89	1.93	
17 A+C+D	0.03	0.06	0.11	0.16	0.22	0.31	0.38	0.55	0.63	0.77	0.92	1.30	1.75	1.98	2.03	
Average value	0.04	0.06	0.11	0.16	0.22	0.30	0.37	0.54	0.62	0.75	0.90	1.26	1.73	1.94	1.98	
18 B								-	0.01	0.06	0.26	0.53	0.91	1.42	1.50	
19 C											-	0.39	1.15	1.27	1.55	
20 BC									0.01	0.06	0.26	0.74	1.58	1.86	1.97	
21 BC									0.01	0.06	0.24	0.75	1.51	1.86	1.97	
22 BC									0.01	0.07	0.29	0.77	1.61	1.97	2.01	
Average value									0.01	0.06	0.26	0.75	1.57	1.90	1.98	

When the results set forth in the above table are plotted as a graphical representation, they become as shown in FIGURE 1. It is apparent from this graph that the density range is expanded by the use of the process and the press plates according to this invention. Furthermore, the density curve of a printed matter printed with the press plates of this invention is similar in shape to that of the theoretical density curve of the positive film from which it is apparent that the renderability is better than that known heretofore. In this graph, the shaded region represents the middle tone parts of the printed matter, and (A + C + D) printed with the use of the press plates of the invention has no dot gain in the middle parts in comparison with those of conventional printing, indicating that good printing has been achieved.

FIGURE 2 is a graph showing the density curve of a printed matter printed by only the plates B and C together with the density curve of a printed matter printed by the plates B + C.

WHAT WE CLAIM IS:—

1. An offset halftone printing process comprising a basic step of printing, in entirety, a basic impression, with a solid density to reproduce faithfully at least light-tone to middle-tone parts, of an original; and at least one supplemental step of printing a supplementary impression, with screen-dot areas smaller than those in corresponding parts of said basic impression, of only the parts of the original having screen dot areas greater than a predetermined screen dot area corresponding to a screen percentage equal to or greater than 50%; said steps being carried out in optional sequence, and the impressions being superimposed.

2. An offset halftone printing process as claimed in claim 1, in which the supplemental step consists of only one step; the basic impression is printed by a printing plate adapted for faithfully reproducing the parts of the original having screen-dot areas less than a specific screen-dot area corresponding to a screen percentage between 50% and 90%; and the supplemental printing step is carried out by a printing plate adapted for printing an impression of only the parts of the original having screen-dot areas greater than said specific screen-dot area.

3. An offset halftone printing process as claimed in claim 1, in which the supplemental step consists of first and second steps; the basic step printing is carried out by a printing plate adapted for faithfully reproducing the parts of the original having screen-dot areas less than the screen-dot area corresponding to a

screen percentage of 70%; the first supplemental step printing is carried out by a printing plate adapted for printing an impression of only those parts of the original having screen-dot areas corresponding to screen percentages greater than 70%; and the second supplemental step printing is carried out by a printing plate adapted for printing an impression, with screen-dot areas smaller than those in corresponding parts of the said first supplemental impression, of only those parts of the original having screen-dot areas greater than the screen-dot area corresponding to a screen percentage of 80%.

4. An offset halftone printing process as claimed in claim 1, in which the supplemental step consists of first and second steps; the basic printing step is carried out by a printing plate adapted for faithfully reproducing the parts of the original having screen-dot areas smaller than the screen-dot area corresponding to a screen percentage of 90%; the first supplemental step printing is carried out by a printing plate adapted for supplementarily printing an impression of only those parts of the original having screen-dot areas corresponding to screen percentages greater than 90%; and the second supplemental step printing is carried out by a printing plate adapted for printing impression, with screen-dot areas smaller than those in corresponding parts of said first supplemental impression, of only those parts of the original having screen-dot areas greater than that corresponding to a screen percentage of 95%.

5. A set of halftone offset press plates for use in carrying out the process of any preceding claim, comprising a base plate which has been contact-photoprinted with a screened film made from a transparent or reflecting original to provide a basic impression having light tones, middle tones and dark tones varying in dot density from below 10% to above 90%, and at least one supplemental printing plate for printing a supplemental impression of only those parts of the original having screen-dot percentages greater than a value above 50%, said supplemental printing plate having a screen dot percentage which is less than the screen dot percentage of the base plate for each dot density of the original, said plates being correlated to print a superposed impression of the plates.

6. A set of halftone offset press plates as claimed in claim 5, wherein the supplemental printing plate is provided with dots only in the regions corresponding to the parts of the original having screen percentages with values equal to or greater than 70%, a third printing plate being provided having dots only in the regions



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When the results set forth in the above table are plotted as a graphical representation, they become as shown in FIGURE 1. It is apparent from this graph that the density range is expanded by the use of the process and the press plates according to this invention. Furthermore, the density curve of a printed matter printed with the press plates of this invention is similar in shape to that of the theoretical density curve of the positive film from which it is apparent that the renderability is better than that known heretofore. In this graph, the shaded region represents the middle tone parts of the printed matter, and (A + C + D) printed with the use of the press plates of the invention has no dot gain in the middle parts in comparison with those of conventional printing, indicating that good printing has been achieved.

FIGURE 2 is a graph showing the density curve of a printed matter printed by only the plates B and C together with the density curve of a printed matter printed by the plates B + C.

WHAT WE CLAIM IS:—

1. An offset halftone printing process comprising a basic step of printing, in entirety, a basic impression, with a solid density to reproduce faithfully at least light-tone to middle-tone parts, of an original; and at least one supplemental step of printing a supplementary impression, with screen-dot areas smaller than those in corresponding parts of said basic impression, of only the parts of the original having screen dot areas greater than a predetermined screen dot area corresponding to a screen percentage equal to or greater than 50%; said steps being carried out in optional sequence, and the impressions being superimposed.

2. An offset halftone printing process as claimed in claim 1, in which the supplemental step consists of only one step; the basic impression is printed by a printing plate adapted for faithfully reproducing the parts of the original having screen-dot areas less than a specific screen-dot area corresponding to a screen percentage between 50% and 90%; and the supplemental printing step is carried out by a printing plate adapted for printing an impression of only the parts of the original having screen-dot areas greater than said specific screen-dot area.

3. An offset halftone printing process as claimed in claim 1, in which the supplemental step consists of first and second steps; the basic step printing is carried out by a printing plate adapted for faithfully reproducing the parts of the original having screen-dot areas less than the screen-dot area corresponding to a

screen percentage of 70%; the first supplemental step printing is carried out by a printing plate adapted for printing an impression of only those parts of the original having screen-dot areas corresponding to screen percentages greater than 70% and the second supplemental step printing is carried out by a printing plate adapted for printing an impression, with screen-dot areas smaller than those in corresponding parts of the said first supplemental impression, of only those parts of the original having screen-dot areas greater than the screen-dot area corresponding to a screen percentage of 80%.

4. An offset halftone printing process as claimed in claim 1, in which the supplemental step consists of first and second steps; the basic printing step is carried out by a printing plate adapted for faithfully reproducing the parts of the original having screen-dot areas smaller than the screen-dot area corresponding to a screen percentage of 90%; the first supplemental step printing is carried out by a printing plate adapted for supplementarily printing an impression of only those parts of the original having screen-dot areas corresponding to screen percentages greater than 90%; and the second supplemental step printing is carried out by a printing plate adapted for printing impression, with screen-dot areas smaller than those in corresponding parts of said first supplemental impression, of only those parts of the original having screen-dot areas greater than that corresponding to a screen percentage of 95%.

5. A set of halftone offset press plates for use in carrying out the process of any preceding claim, comprising a base plate which has been contact-photoprinted with a screened film made from a transparent or reflecting original to provide a basic impression having light tones, middle tones and dark tones varying in dot density from below 10% to above 90%, and at least one supplemental printing plate for printing a supplemental impression of only those parts of the original having screen-dot percentages greater than a value above 50%, said supplemental printing plate having a screen dot percentage which is less than the screen dot percentage of the base plate for each dot density of the original, said plates being correlated to print a superposed impression of the plates.

6. A set of halftone offset press plates as claimed in claim 5, wherein the supplemental printing plate is provided with dots only in the regions corresponding to the parts of the original having screen percentages with values equal to or greater than 70%, a third printing plate being provided having dots only in the regions

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5 corresponding to the parts of the original having screen percentages with values equal to or greater than 80%, the screen dot area in each region of the third plate being less than that in the equivalent regions of the supplemental plate.

10 7. A set of halftone offset press plates as claimed in claim 6, wherein the supplemental plate has dots only in the regions corresponding to the parts of the original having a screen percentage with a value equal to or greater than 90%, and the third plate has dots only in the regions

15 corresponding to the parts of the original having a screen percentage with a value equal to or greater than 95%.

8. An offset halftone printing process substantially as herein described.

20 9. A set of halftone offset press plates substantially as herein described.

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